

What is claimed is:

1. A power supply circuit comprising:

a main transistor placed in a power transmission path connecting an input terminal and an output terminal;

5 a voltage detecting circuit configured to detect a detected voltage in response to an output voltage supplied through the output terminal;

a reference-voltage producing circuit configured to producing a reference voltage in accordance with a target voltage;

10 a voltage control circuit configured to control the main transistor so that the detected voltage is consistent with the reference voltage;

a current detecting circuit configured to detect an output current supplied through the output terminal;

15 a limited-current-value setting circuit configured to set a limited value of the output current so that the limited value increases gradually in cases where the output voltage is made to rise up to the target voltage; and

20 a current limiting circuit configured to control the main transistor so that the output current keeps a value less than or equal to the limited value in cases where the output voltage is made to rise up to the target voltage.

25 2. The power supply circuit according to claim 1, wherein the limited-current-value setting circuit is configured to stepwise increase the limited value with an elapse in time during a rise of the output voltage.

30 3. The power supply circuit according to claim 2, wherein the limited-current-value setting circuit is configured to stepwise increase the limited value by a predetermined amount at given intervals of time during the rise of the output voltage.

4. The power supply circuit according to claim 2, wherein the

limited-current-value setting circuit is provided with a timer circuit counting a predetermined period of time and a limited-value increasing circuit increasing the limited value by the predetermined amount when the timer circuit finishes counting the predetermined period of time.

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5. The power supply circuit according to claim 2, wherein the power supply circuit is formed into a series regulator having circuitry in which a current supply path serving as the power transmission path is placed to connect both of the input terminal and the output terminal, the  
10 main transistor being placed in the current supply path.

6. The power supply circuit according to claim 1, wherein the limited-current-value setting circuit is configured to continuously increase the limited value with an elapse in time during a rise of the  
15 output voltage.

7. The power supply circuit according to claim 6, wherein the power supply circuit is formed into a series regulator having circuitry in which a current supply path serving as the power transmission path is placed to connect both of the input terminal and the output terminal, the  
20 main transistor being placed in the current supply path.

8. The power supply circuit according to claim 1, wherein the power supply circuit is formed into a series regulator having circuitry in  
25 which a current supply path serving as the power transmission path is placed to connect both of the input terminal and the output terminal, the main transistor being placed in the current supply path.

9. The power supply circuit according to claim 1, further  
30 comprising a delay control circuit configured to output a rise start signal at a time when a ringing component of an input voltage that has been applied to the input terminal is reduced,

wherein the limited-current-value setting circuit is configured to set the limited value of the output current so that the limited value increases gradually, in response to the outputted rise start signal; and

5 the current limiting circuit configured to control the main transistor so that the output current keeps the limited value, on the basis of the output current detected by the current detecting circuit and the limited value set by the limited-current-value setting circuit.

10 10. The power supply circuit according to claim 9, wherein the time when the delay control circuit outputs the rise start signal is designated as a time when a predetermined period of time elapses after the application of the input voltage to the input terminal.

15 11. The power supply circuit according to claim 10, wherein the delay control circuit is provided with a charge circuit operating with the input voltage applied and providing a charge voltage on the input voltage and a comparison circuit drawing a comparison between the charge voltage and a given threshold so as to output the rise start signal.

20 12. The power supply circuit according to claim 10, wherein the delay control circuit is provided with an oscillation circuit outputting a reference clock signal and a timer circuit operating using the reference clock signal to output the rise start signal when the predetermined period of time elapses after the application of the input voltage to the input  
25 terminal.

13. The power supply circuit according to claim 10, further comprising a shutoff circuit configured to control the main transistor in an off-state thereof until the rise start signal is outputted.

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14. The power supply circuit according to claim 10, wherein the power supply circuit is formed into a series regulator having circuitry in

which a current supply path serving as the power transmission path is placed to connect both of the input terminal and the output terminal, the main transistor being placed in the current supply path.

5           15. The power supply circuit according to claim 9, wherein the delay control circuit is provided with a comparison circuit drawing a comparison between the applied input voltage and a given threshold so as to output a comparison signal and a constant-level detecting circuit outputting the rise start signal on condition that the comparison signal is  
10 kept at the same level for a given interval of time.

          16. The power supply circuit according to claim 9, further comprising a shutoff circuit configured to control the main transistor in an off-state thereof until the rise start signal is outputted.

15           17. The power supply circuit according to claim 9, wherein the power supply circuit is formed into a series regulator having circuitry in which a current supply path serving as the power transmission path is placed to connect both of the input terminal and the output terminal, the  
20 main transistor being placed in the current supply path.

          18. The power supply circuit according to claim 9, further comprising a shutoff circuit configured to control the main transistor in an off-state thereof until the rise start signal is outputted.

25           19. The power supply circuit according to claim 9, wherein the power supply circuit is formed into a series regulator having circuitry in which a current supply path serving as the power transmission path is placed to connect both of the input terminal and the output terminal, the  
30 main transistor being placed in the current supply path.